



Engineers

**Limited Visual Structural Condition and
Conversion Report**

Job No.	W20976
Client	Tim Davison
Project	Cow Barn, Tess View, Yarm
Reference	W20976-WBE-XX-XX-RP-S-1000
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Document Issue Record

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P01	5/05/2022	Initial Issue	EC	KWS
P02	21/04/2024	Roof comments added for different pitch	KWS	CS



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1. INTRODUCTION

1.1. Preamble

- 1.1.1. This report is produced for the private and confidential use by Tim Davison (The Client) for whom the survey was undertaken. This report should not be reproduced whole, in part or relied upon by third parties without the express permission of **WB Engineers** and the Client.

1.2. Background

- 1.2.1. **WB Engineers** were commissioned by The Client to undertake a non-intrusive visual survey. The building is known as the Cow Barn, Tees View, Worsall Road, Yarm TS15 9EB.
- 1.2.2. The Client is proposing/planning to convert the agricultural cow barn in to a mixed use building. **WB Engineers** undertook a non-intrusive visual survey of the building on the 1st March & 22nd April 2022.
- 1.2.3. During the inspections the weather was clear and dry.
- 1.2.4. An aerial view of the building is shown below;



Figure 1 – Location

- 1.2.5. The building is a timber frame barn with timber truss roof construction, light weight metal sheeting roof and timber slatted cladding panels. The barn has partial-height masonry walls on 3-sides.

1.3. Brief

1.3.1. Our initial brief was as follows:

- To review the structural integrity of the building with consideration of the conversion into a mixed use building.
- To inspect the main structural elements of the building internally and externally.
- To comment on the implications of the findings and recommend any further works or inspections.
- To comment on suitability for conversion into mixed use building.

1.4. Limitations

- 1.4.1. Internal inspection of the ground floor was carried out. An external inspection of the walls and the roof was made from ground level. No finishes were removed as part of the survey.
- 1.4.2. No ground investigations have been undertaken as part of this survey. We assume that all issues in relation to potential hazards including potential for shallow mine workings, backfilled quarries or other fundamental issues that could affect a property have been assessed as part of the initial survey searches and therefore are not a design risk here.
- 1.4.3. We have taken all anecdotal evidence in good faith and validation of this is out of the scope of our commission.
- 1.4.4. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.
- 1.4.5. It must be noted that works undertaken as part of the survey did not include the use of a damp meter. The term 'damp' used in this report is based on visual evidence only, indicating signs of the presence of moisture within an element.
- 1.4.6. Any cracks noted in this report were inspected on site and this has not been monitored by **WB Engineers** over any significant period of time, therefore, our comments are based on a single visit review and cannot confirm whether the cracking in the walls is ongoing or ceased.
- 1.4.7. The findings and subsequent recommendations made in this report are subject to interpretation from only those areas that could be inspected at the time of survey; relate only to the parts of the structure identified in the brief and are subject to the assumptions stated within the report. Other observations and subsequent recommendations made in the report are made in good faith and we accept no liability for any decisions made on the additional observations provided.

2. SURVEY

2.1. General Description

- 2.1.1. The building is a timber frame barn with a traditional truss and rafter/purlin roof with light weight metal sheet roofing. The barn has various cladding finishes including timber slatted panels, fibrous cement sheets and has partial-height masonry walls on 3-sides.
- 2.1.2. The building is presently a working agricultural barn with a vehicle car port at the front.



Figure 2 – East Elevation



Figure 3 – North Elevation

2.2. Findings

- 2.2.1. Timber deterioration was noted at both ends of a car canopy post on the west elevation. (Photograph 1 and 2).
- 2.2.2. Signs of woodworm were present on cladding panels in multiple locations (photograph 3).
- 2.2.3. A broken cladding panel was recorded on the west elevation towards the northwest corner of the barn (photograph 4).
- 2.2.4. Several missing fibre cement cladding panels were noted on the north elevation (Photograph 5).
- 2.2.5. Sections of the north elevation masonry wall appeared to lean at the top of wall (photograph 6).
- 2.2.6. Loss of timber section was recorded on several timber post above the concrete encasement in the car port (Photograph 7, 8 and 9).
- 2.2.7. A car port canopy post base connection could not be inspected due to vegetation growth on the south elevation (photograph 10).
- 2.2.8. Signs of timber deterioration at a rafter bearing were noted below the valley gutter in the barn (photograph 11).
- 2.2.9. Timber rafter failure was noted at the bearing below the valley gutter in the barn (photograph 12).
- 2.2.10. Timber deterioration and loss of timber section were recorded to the barn door post (photograph 13).

- 2.2.11. Several timber canopy roof purlins were noted as splice construction (photograph 14).
- 2.2.12. Signs of rust and surface corrosion were present on bolts in timber-to-timber connections in multiple locations of the barn (photograph 15 and 16).

3. ASSESSMENT

3.1. Discussion of Findings

- 3.1.1. Generally, the cow barn was found to be in fair condition.
- 3.1.2. Timber deterioration and loss of section to the timber posts is associated with timber rot and a lack of maintenance. Surface water is considered to collect on the concrete encasement and locally increase the moisture content of the timbers. It is likely the timber has not been suitably protected and therefore the wet timber has decayed over a prolonged period. Without remedial works, further loss of section and eventual failure of the posts will occur.
- 3.1.3. Woodworm is associated with exposed timber and a lack of maintenance. Exposed timbers typically have higher moisture levels, this provides a fertile environment for woodworm infestations. Without protective treatment, further infestations may occur and result in the loss of section of timber cladding. It is considered that issues with the cladding system will be addressed as part of the proposed refurbishment cladding system.
- 3.1.4. Missing cladding panels are associated with the failure of panel fixings. The missing cladding panels reduce the weather-tightness of the barn and increase the risk of timber deterioration to structural elements from weathering or water ingress. It is considered that issues with the cladding system will be addressed as part of the proposed refurbishment cladding system.
- 3.1.5. The lean on the north elevation masonry wall is associated with age and movement over time. The lean is not considered a structural issue at present and risk of instability is low.
- 3.1.6. The timber base connection is hidden by vegetation and requires inspecting onsite following the removal of vegetation.
- 3.1.7. Timber deterioration at the rafter bearing is associated with water damage as a result of the failure of the valley gutter. Without repair, further deterioration will result in the failure of the rafter. The failing rafter element requires repair/local replacement.
- 3.1.8. Similar to 3.1.7, failure of the timber rafter is associated with water damage due to the failure of the valley gutter. It is considered that as result of the failure of the rafter that other structural elements will be taking additional loads greater than the designed loads. The failing rafter element requires repair/local replacement.
- 3.1.9. The timber roof purlins splice connections are associated with ease of construction and material availability. No defects were identified from ground level inspection, but the splice connections require further inspection at a closer distance as part of any roof cladding replacement to confirm suitability.
- 3.1.10. Surface corrosion of the timber-to-timber steel connections is due to exposure. Connections appear to be functioning as designed with no signs

of failure. Connections should be inspected as part of the future maintenance plan and/or major refurbishment works.

3.2. Specific Conversion Comments

- 3.2.1. The proposals intends to update the building envelope with similar cladding materials to that of existing and in line with the adjacent properties. Therefore, it is considered no increase in dead load will occur. In addition, the designed roof and floor imposed load will not change as the building use has not changed and footprint is not to be increased.
- 3.2.2. The existing barn has areas of slatted timber cladding which provide partial coverage and allow lateral loads to pass through the structure. The proposed cladding will introduce closed cladding in some areas. Consequently, the lateral loads acting on the structure will increase. However, the increase in lateral loads will be dealt with as part of the proposed new walls/room segregation and layout. The introduction of internal partitions will be designed to provide racking resistance sufficient to counteract any additional lateral loads on the timber frame.
- 3.2.3. Based on the comparable vertical loads and the introduction of internal partitions to provide racking resistance, it is considered that the timber frame structure is adequate for the proposed scheme and capable of supporting the roof.
- 3.2.4. The latest planning drawings indicate a single roof fall to the rear of the building, omitting the current double ridge arrangement which requires an internal valley.

Based on the existing structural arrangement, the structure is capable of supporting the infill of the roof and slight modification to the roof falls by means of additional timbers locally. As per the discussions, some local timber repairs are required where water ingress has occurred. As part of these repairs, some additional timbers can be provided to suit the desired roof arrangement.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

- 4.1.1. Generally, the barn is in fair condition.
- 4.1.2. In principle, the existing structure is suitable for the proposed conversion works without extensive works to the key existing structural components.
- 4.1.3. Based on the proposed plans, the introduction of closed cladding in some areas will increase lateral loads acting on the structure. However, the increase in lateral loads will be dealt with as part of the proposed new walls/room segregation and layout. It is considered that no change in dead or imposed floor or roof loading will occur from the conversion.
- 4.1.4. Most timber elements are in a condition typical of the exposed nature of the barn with signs of natural and expect deflections based on the nature of the supported material.
- 4.1.5. The majority of defects to the timber structural elements are associated with timber rot. Where timber deterioration has resulted in a loss of section, or a failure of the member, the timber requires repairs/replacement. These are only in a number of isolated locations.
- 4.1.6. The loss of sections to the ends of timber posts is associated with timber rot and wet timber. Compromised timber sections to be locally replaced and new timber to be suitably encased as part of the refurbishment works.
- 4.1.7. Deterioration or failure of timber rafters in the barn is associated with the failure of the valley gutter above. It is considered that the issues with the valley gutter will be addressed as part of the proposed roof repairs/replacement with the defective elements repaired/replaced locally.
- 4.1.8. The car port purlin splice connections appeared suitable. However, a visual inspection of the connections is required to confirm connection integrity as part of any roof cladding replacement or repairs.
- 4.1.9. Surface corrosion of the timber-to-timber steel connection is a not a current structural issue. Connections should be inspected and monitored as part of the proposed buildings future maintenance plan if to remain exposed.
- 4.1.10. The latest planning drawings indicate a single roof fall to the rear of the building, omitting the current double ridge arrangement which requires an internal valley.

Based on the existing structural arrangement, the structure is capable of supporting the infill of the roof and slight modification to the roof falls by means of additional timbers locally.

4.2. Recommendations

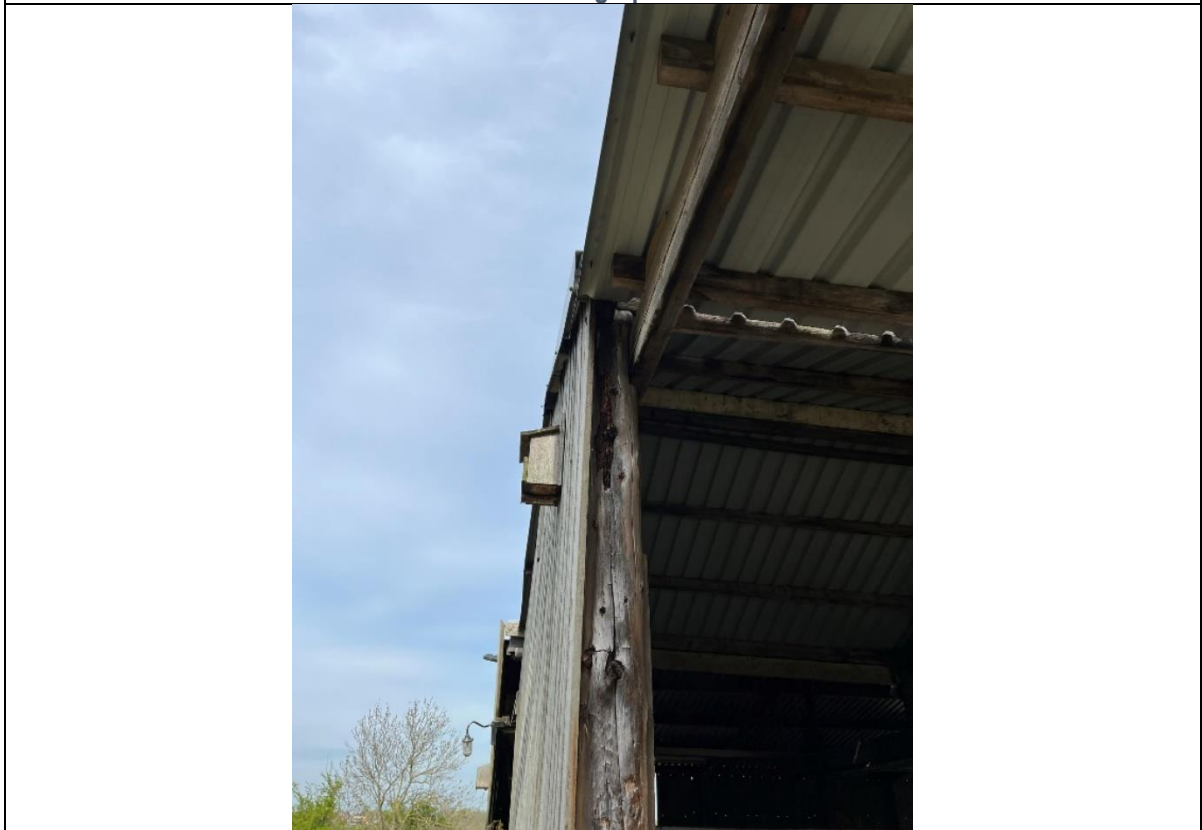
- 4.2.1. Compromised timber post sections to be removed locally and new sections installed. New timber post to be suitably encased to existing concrete.
- 4.2.2. Barn timber door post to be replaced.
- 4.2.3. Failed or compromised timber rafters to be locally repaired or replaced.
- 4.2.4. Timber base connection of canopy post to be inspected following the removal of vegetation.
- 4.2.5. Canopy roof timber splice connections to be inspected and integrity confirmed as part of roof repairs/replacement.
- 4.2.6. Timber-to-timber steel connections to be inspected on a regular basis as part of the barn's future maintenance plan if to remain exposed.
- 4.2.7. As part of the timber repair works, additional timbers will be required to suit the desired roof fall to omit the internal drainage gutter between the original double roof ridge.

APPENDIX A

Photographs



Photograph 1



Photograph 2



Photograph 3



Photograph 4



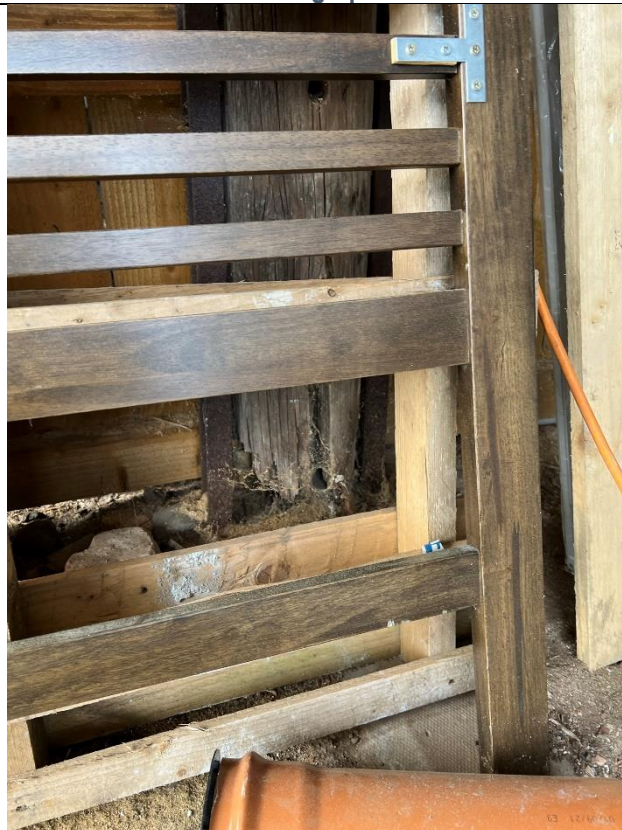
Photograph 5



Photograph 6



Photograph 7



Photograph 8



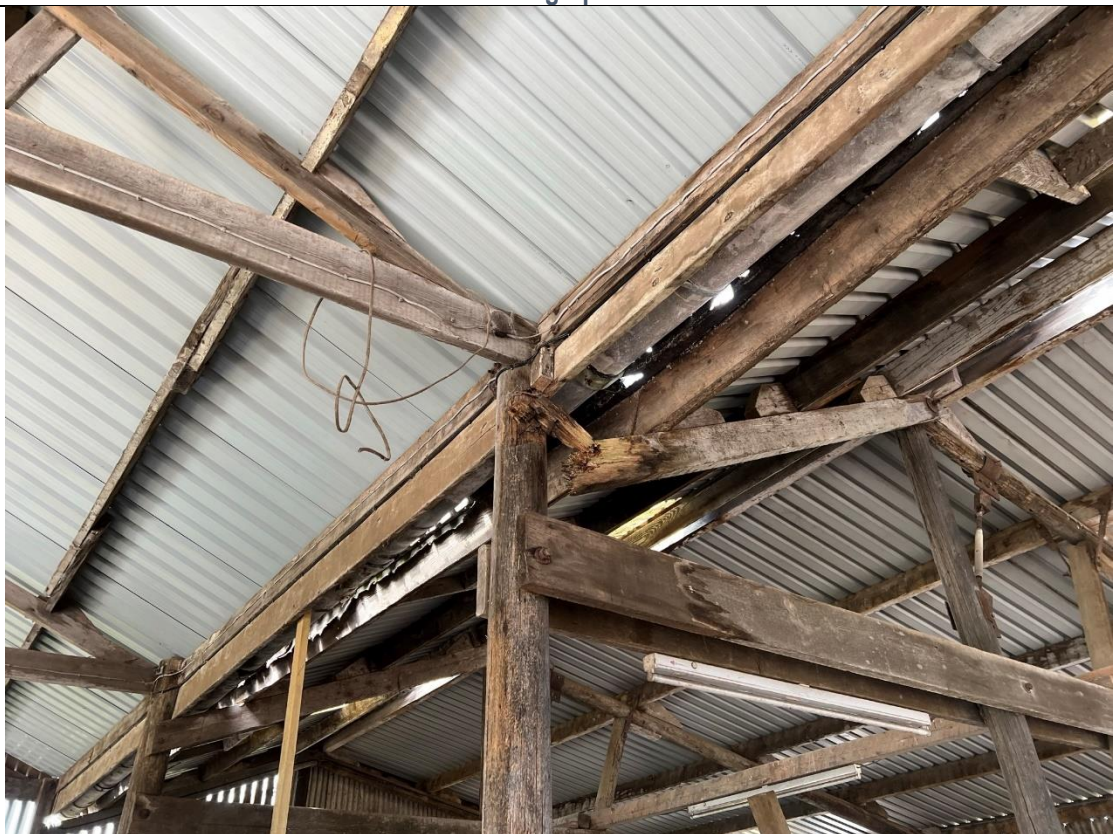
Photograph 9



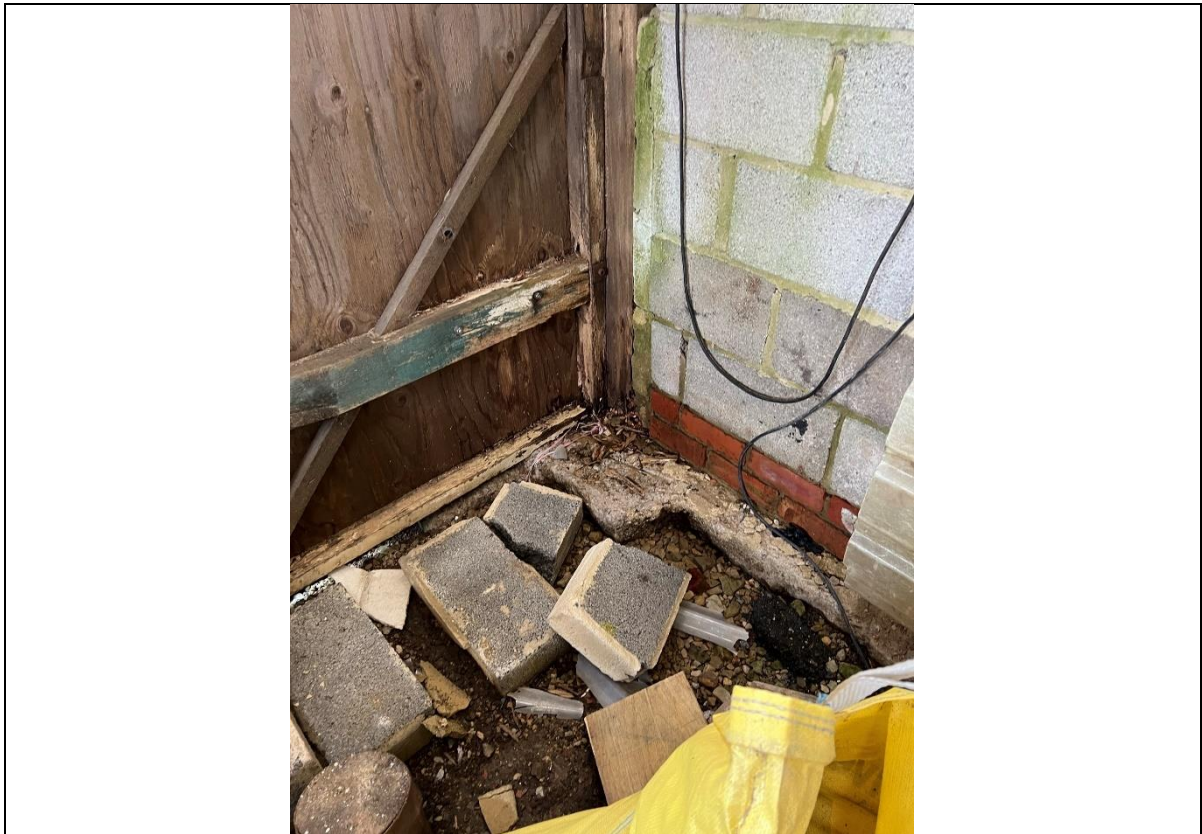
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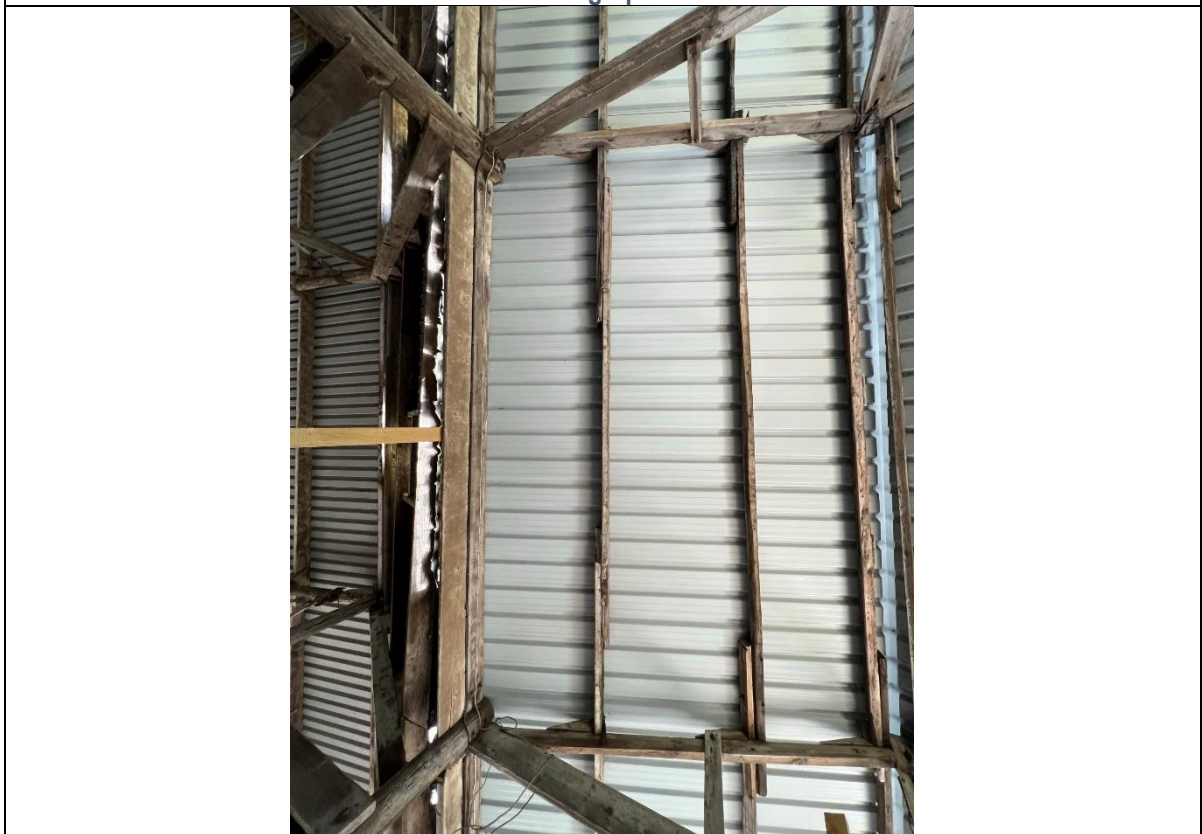
Photograph 11



Photograph 12



Photograph 13



Photograph 14



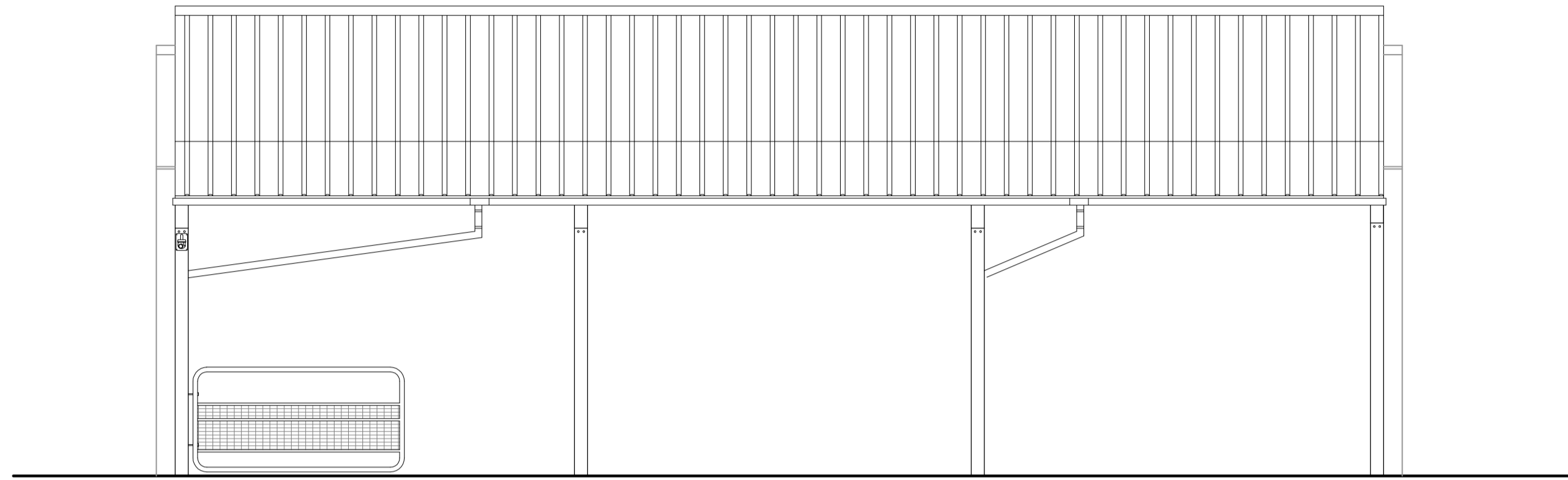
Photograph 15



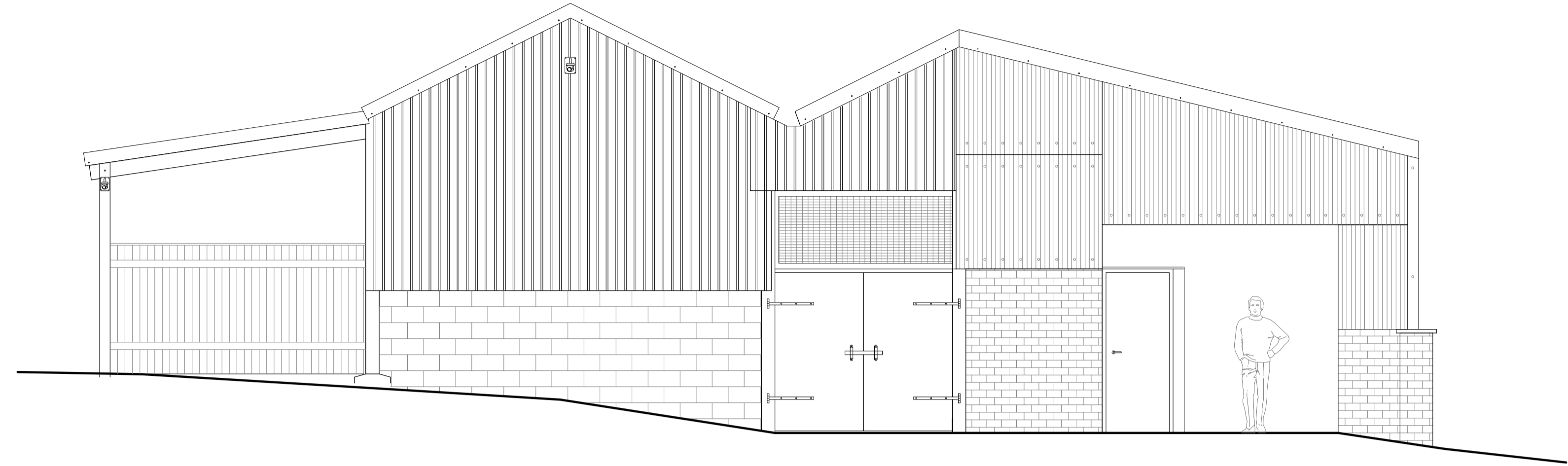
Photograph 16

APPENDIX B

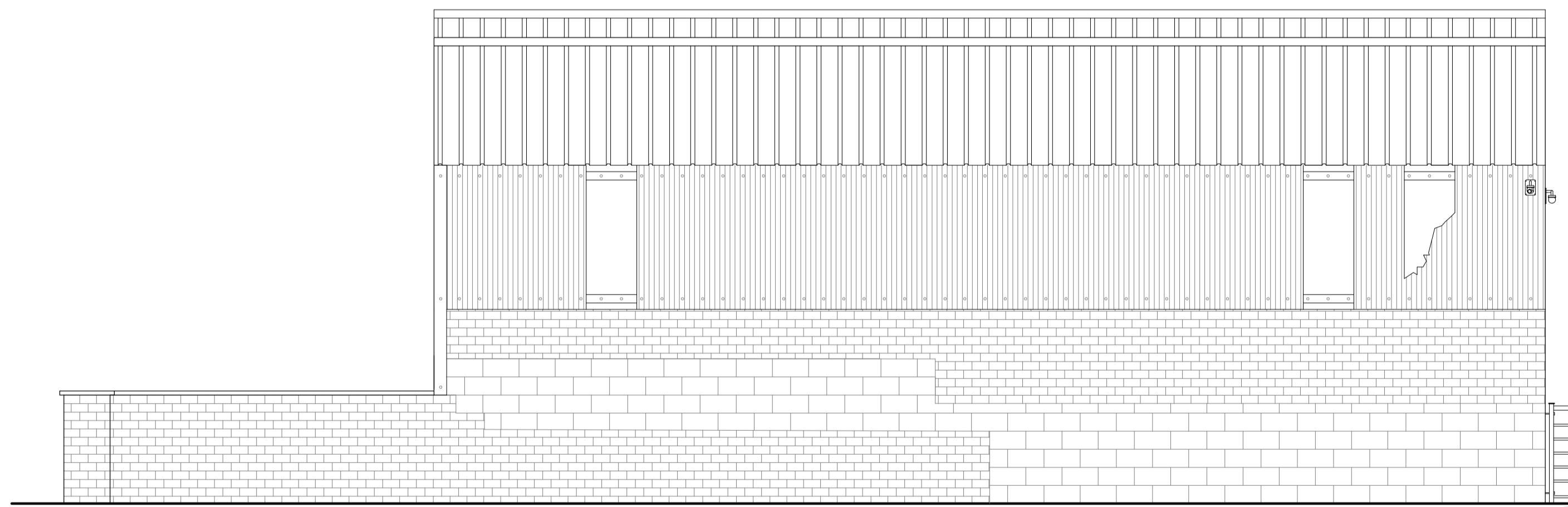
Architects Proposals



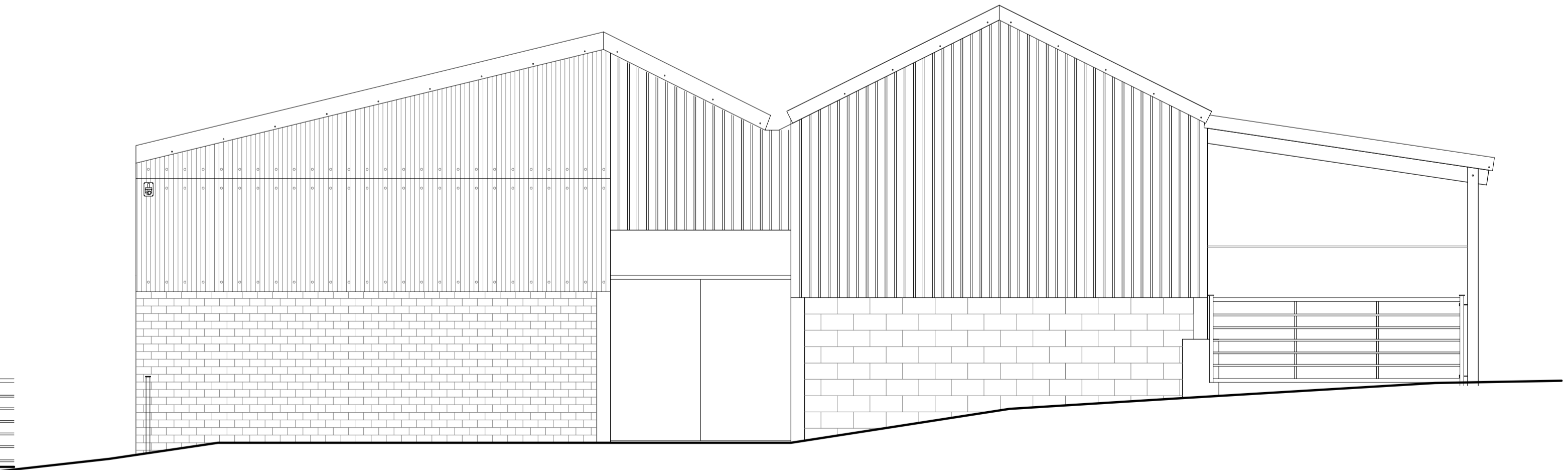
SOUTH ELEVATION



EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION

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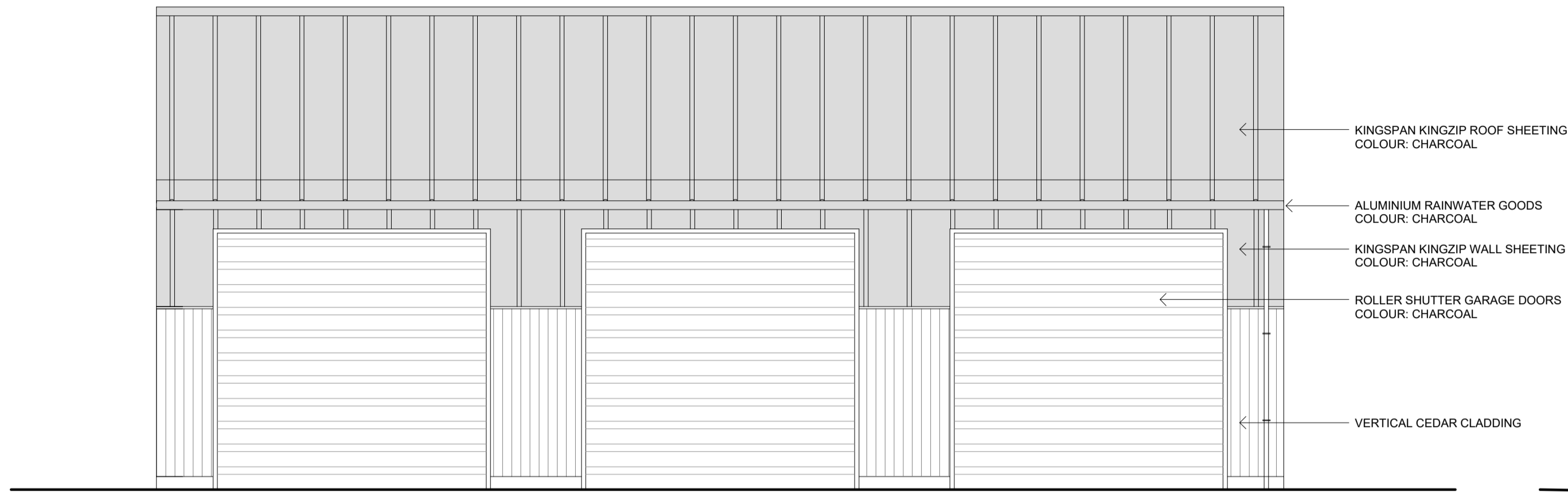
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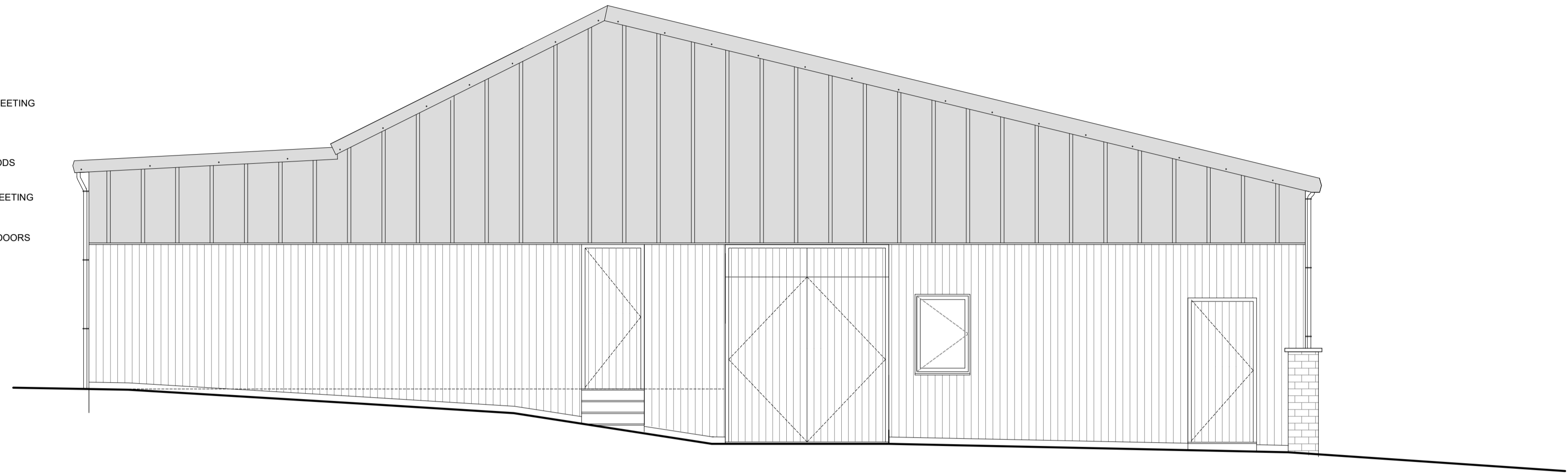
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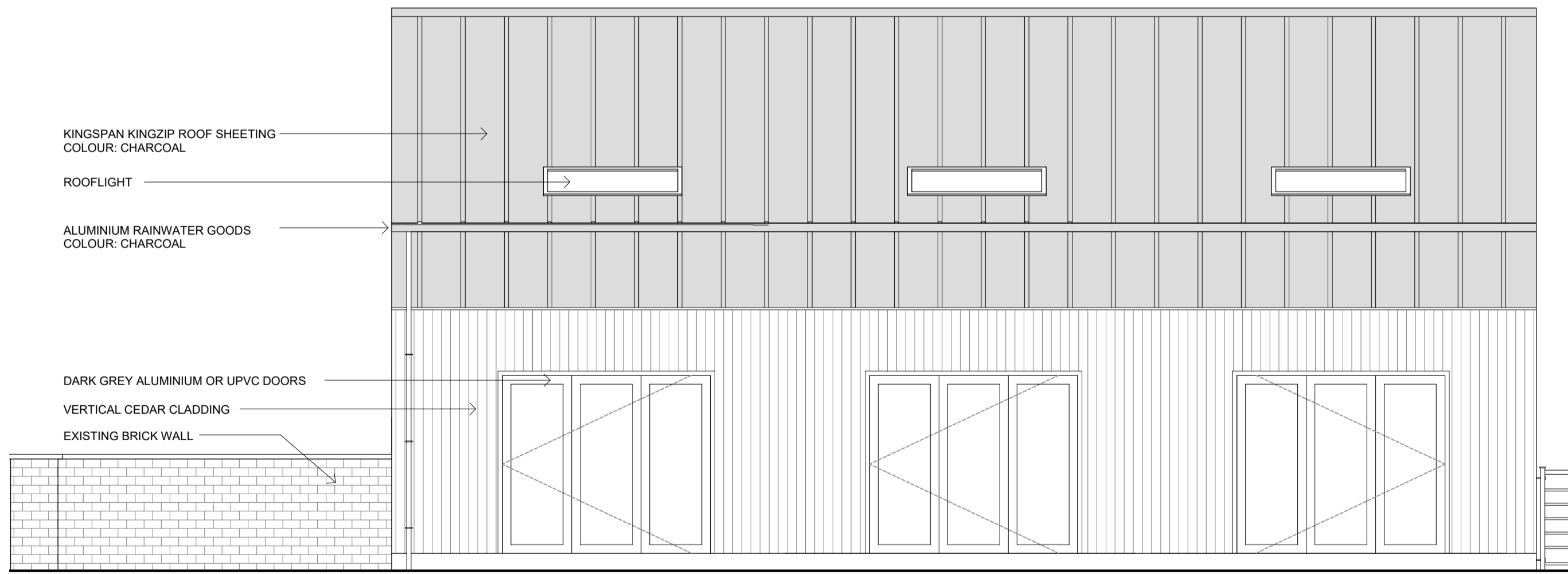
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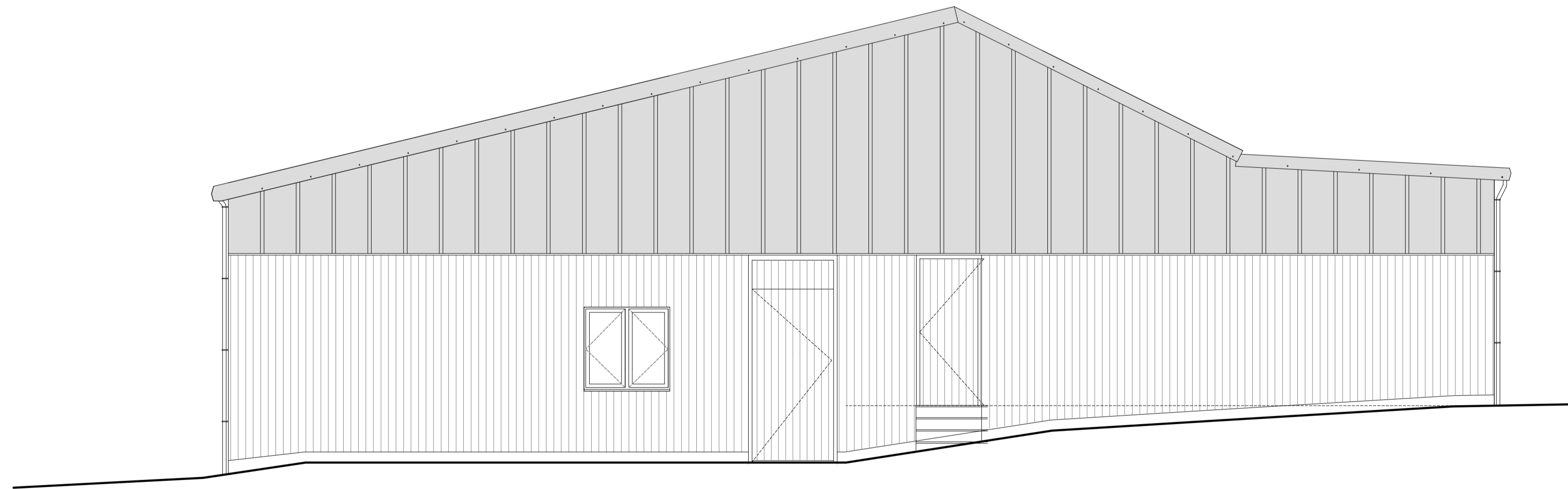
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